

Ecotourism and Sustainable Development in Protected Areas: Analysis of the Economic Impact of Tourism in Marojejy National Park

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Abstract

Ecotourism is widely recognized as a strategic approach that reconciled biodiversity conservation with local economic development in protected areas. This study analyzes the direct and indirect economic impacts of tourism in Parc national de Marojejy, located in northeastern Madagascar and part of the UNESCO-listed Atsinanana humid forests. Field surveys conducted with local stakeholder's guides, hotel owners, artisans, and households were combined with secondary data from Madagascar National Parks and the World Tourism Organization to assess tourism's contribution to local incomes and identify structural constraints limiting its potential. Findings indicate that ecotourism creates seasonal employment, incentives related activities (handicrafts, transport, supply agriculture), and strengthens community incentives for conservation. However, these benefits remain constrained by poor access infrastructure, weak territorial marketing, seasonality of tourists flows, and unequal distribution of revenues among stakeholders. The lack of formal revenue-sharing mechanisms and participatory governance reduces the expected redistributive impact. The paper highlights the need for better structuring of the ecotourism value chain, strengthened local capacities, and shared governance involving park authorities, local governments, private operators, and communities. It recommends improving local value chains, professionalizing services, and implementing targeted promotion strategies to enhance ecotourism's contribution to sustainability development.

Keywords: Ecotourism, Sustainable Development, Marojejy, Local Income, Protected Areas, Madagascar

1. Introduction

Globally, the accelerated degradation of ecosystems, the loss of biodiversity, and human pressure on natural resources have led researchers and policymakers to seek models that reconcile conservation and development. In this context, ecotourism has gradually emerged as an approach capable of combining environmental protection, heritage enhancement, and improved living conditions for local populations. According to World Tourism Ecotourism, as an organization, is based on the responsible visitation of natural environments, contribution to conservation, and the active participation of host communities. This definition highlights a dual purpose: ecological and socio-economic. The seminal work of Martha Honey emphasizes that ecotourism can only be considered "sustainable" if it generates measurable benefits for local communities while simultaneously funding conservation [1]. Similarly, David Weaver demonstrates that ecotourism serves as a tool for territorial development when local value chains are effectively integrated into tourism activities

[2]. These theoretical perspectives are reinforced by Ralf Buckley, who highlights the importance of governance mechanisms, revenue sharing, and community participation for the success of ecotourism projects in protected areas [3]. In Madagascar, a country classified as one of the world's biodiversity hotspots, protected areas serve as ideal laboratories for observing these dynamics. The island's exceptional biological richness, coupled with the socio-economic vulnerability of rural communities, makes analyzing the role of ecotourism in promoting sustainable development particularly relevant. National conservation policies, implemented notably by Madagascar National Parks, have integrated ecotourism as a pillar of alternative funding and economic development for the parks. Among these areas, Marojejy National Park stands out for its ecological and scenic importance. Located in the SAVA region, this park is home to rare mountain ecosystems, high levels of floral and faunal endemism, and emblematic species such as the Silky Sifaka (*Propithecus, Sycamoreus, Candidus*). Its inclusion in the UNESCO World Heritage Site of the Rainforests of Atsinanana

enhances its international visibility and tourist appeal [4]. This global recognition suggests significant ecotourism potential that could support the local economy. However, the mere presence of visitors does not automatically guarantee significant economic benefits for riverside communities.

Several empirical studies, notably those by Kreg Lindberg and Anna Spenceley demonstrate that the benefits of ecotourism can be captured by external actors when redistribution mechanisms are not formalized [5,6]. In some cases, local populations remain marginalized, limited to precarious or seasonal jobs, without any real integration into the tourism value chain. This issue is particularly acute in rural areas of Madagascar where access to infrastructure, vocational training, and organizational capacity remains limited. The communities surrounding Marojejy rely primarily on subsistence farming, forestry, and small-scale commercial activities. Ecotourism thus appears as an opportunity to diversify incomes, but its effectiveness depends on structural factors: site accessibility, quality of services, territorial marketing, participatory governance, and public-private partnerships. Thus, the central question guiding this research is: does ecotourism in Marojejy National Park truly contribute to the sustainable development of local communities? This question relates to tourism's capacity to generate sustainable income, create local jobs, strengthen community capacities, and support the conservation of natural resources. The main objective of this article is therefore to assess the economic impact of tourism in the park by analyzing the direct financial benefits (jobs, income, services) and indirect benefits (multiplier effects, related activities) for local populations. It also aims to identify the structural constraints that hinder the optimization of this ecotourism potential. This study falls within the field of sustainable development research, employing a territorial approach that considers the protected area as an integrated socio-ecological system. In this sense, it contributes to the scientific literature by offering a contextualized empirical analysis of an emblematic Malagasy park, which remains relatively undocumented from the economic perspective of ecotourism. Finally, the article aims to formulate operational recommendations for park managers, public decision-makers, tourism operators and local communities, in order to strengthen the effectiveness of ecotourism as a tool for sustainable development in Madagascar's protected areas.

2. Conceptual Framework and Methodology

2.1 Conceptual Framework

This study lies at the intersection of responsible tourism and sustainable development, two analytical frameworks that allow us to assess the actual contribution of tourism activities to the socio-economic and ecological resilience of territories. Responsible tourism, as defined by World Tourism Organization, implies minimizing negative impacts and maximizing positive benefits for host communities and the environment. It constitutes an operational application of sustainable development to the tourism sector. Sustainable development traditionally rests on three pillars: economic viability, social inclusion, and environmental conservation. These dimensions, derived from the work of

Gro Harlem Brundtland (1987), are used here as an analytical framework to assess the effectiveness of ecotourism around Marojejy National Park. Economic viability. This dimension assesses tourism's capacity to generate stable income, create jobs, and stimulate related activities. The theoretical contributions of David Weaver and Ralf Buckley emphasize that ecotourism is only economically viable when local communities are integrated into value chains (guiding, accommodation, food services, crafts, transportation) [2,3].

The analysis therefore focuses on both direct income (tourism jobs) and indirect income (multiplier effects on the local economy). Social inclusion. For ecotourism to be sustainable, it must promote the participation of local communities in decision-making and benefit sharing. The work of Anna Spenceley shows that the absence of revenue-sharing mechanisms limits the redistributive impact of tourism [6]. This study therefore examines the degree of community involvement, access to economic opportunities, and local perceptions of tourism. Environmental conservation. In a protected area managed by Madagascar National Parks, ecotourism is also a tool for financing conservation. This dimension analyzes how tourism revenues support ecosystem protection and influence local behaviors regarding natural resources. These three axes allow us to understand the park as an integrated socio-ecological system, where economic, social, and environmental interactions shape territorial resilience. The adopted conceptual framework thus serves as a matrix for developing survey indicators, interpreting data, and formulating recommendations.

2.2 Methodology

To rigorously assess the economic impact of ecotourism, a mixed-methods approach combining quantitative and qualitative methods was adopted. This methodological choice aligns with the recommendations of John Creswell, who emphasizes the value of triangulation in strengthening the validity of results in applied social science research [7].

2.2.1. Quantitative Household Surveys

A questionnaire survey was conducted among 100 households spread across four villages bordering the park: Manantenina, Mandena, Andapa, and Doany. The sampling method was stratified random sampling to represent different socio-professional categories.

The questionnaire covered:

- Household income sources
- The share of revenue linked to tourism
- The perception of the park's economic effects
- Participation in ecotourism activities
- Expectations regarding tourism development

The data collected made it possible to quantitatively measure the importance of tourism in the domestic economy.

2.2.2. Qualitative Interviews With Tourism Service Providers

Semi-structured interviews were conducted with 15 tourism providers: local guides, hotel managers, restaurant owners, and artisans. This qualitative approach aims to understand the internal

dynamics of the ecotourism sector, the constraints encountered, and the informal mechanisms for distributing benefits.

Topics covered include:

- Revenues generated by tourism
- Infrastructure and logistics difficulties
- Relations with park managers
- Training and promotion need

2.2.3. Document Analysis

A document analysis was carried out based on:

- Reports from Madagascar National Parks
- Statistics from the Ministry of Tourism of Madagascar
- Scientific publications on ecotourism in protected areas

This analysis made it possible to contextualize the field data and to identify historical trends in park attendance.

2.2.4. Data Processing and Triangulation

Quantitative data were processed using SPSS software to produce descriptive statistics (frequencies, means, correlations). Qualitative data underwent manual thematic analysis.

Triangulation between field observations (conducted in 2023), statistical data and actors' discourse helped to strengthen the robustness of the results and limit interpretation biases.

This mixed methodology thus offers a complete and nuanced understanding of the economic impact of ecotourism around Marojejy National Park, by combining the perspectives of households, tourism operators and managing institutions.

3. Results and Discussion

3.1 Level of Tourist Traffic

Data compiled from Madagascar National Parks indicates that Marojejy National Park receives an average of 1,200 to 1,500 visitors per year (2022 statistics). This number remains modest considering the site's ecological potential and in comparison, with other, more accessible Malagasy protected areas. This low visitor numbers are largely explained by the park's geographical isolation, the difficulty of road access, and limited international promotion. Seasonal analysis shows peak visitor numbers during the dry season (May to November), when trails are passable and weather conditions are favorable. Conversely, the rainy season leads to a drastic drop in visits due to the poor condition of the roads and the risks associated with flooding. This seasonality directly impacts the stability of income for local stakeholder's dependent on tourism. According to World Tourism recommendations Organizationally, the regularity of tourist flows is a key factor in the economic viability of ecotourism destinations. In the case of Marojejy, the irregularity of visits limits the professionalization of services and keeps the activity seasonal and precarious.

3.2 Revenue Generated by Ecotourism

The household survey reveals that:

- 22% benefit directly from tourism (guiding, crafts, accommodation, catering)
- 18% derive an indirect benefit (sale of agricultural products, local transport, supplying lodges)

For these households, tourism-related income represents 30 to 50%

of annual income, which is a significant share in a rural context dominated by subsistence farming. Kreg 's analyses Lindberg discusses the multiplier effect of tourism on local economies [5]. Related activities, while not directly tourism-related, are heavily dependent on the presence of visitors. Local farmers supply food to accommodations, transport companies provide connections to the park, and artisans find an outlet for their products. However, this economic contribution remains vulnerable to the variability of tourist flows. The lack of diversification of tourism products (alternative circuits, cultural tourism, agritourism) limits the extension of benefits to a larger number of households.

3.3. Unequal Distribution of Profits

One of the study's key findings concerns the spatial concentration of tourism revenue. Villages located in the immediate vicinity of the park's access trails capture the majority of economic opportunities. Conversely, more remote or poorly served localities remain on the margins of the ecotourism dynamic.

This situation corroborates the work of Anna Spenceley, which shows that without formal redistribution mechanisms, ecotourism tends to reproduce, or even exacerbate, local inequalities [6]. In Marojejy, access to information, training, and contacts with tourism operators is unequally distributed.

This results in a socio-spatial divide where a minority of households fully benefit from the park's positive impacts, while a majority only perceive marginal effects. This inequality could ultimately weaken community support for the park's conservation objectives.

3.4. Identified Obstacles

Several structural constraints limit the optimal development of ecotourism around the park:

- Poor road conditions, particularly during the rainy season, make access difficult for both domestic and international visitors.
- Low accommodation capacity: limited number of accommodations, variable quality of services, lack of professionalism.
- Insufficient training of guides, hoteliers and artisans in terms of tourism standards, foreign languages and management.
- Lack of marketing strategy to promote the park internationally despite its UNESCO status within the Atsinanana Rainforests [4].
- Low involvement of local authorities in the promotion of rural and community tourism.
- These obstacles are consistent with the findings of Ralf Buckley that logistical and institutional constraints are the main obstacles to the success of ecotourism projects in isolated areas [3].

3.5. Integrated Discussion

The results show that ecotourism in Marojejy has real but under-exploited economic potential. It already contributes significantly to the income of some households, but its overall impact remains limited by structural, institutional, and organizational factors. The lack of formalized participatory governance, weak infrastructure, and insufficient international promotion prevent the park from fully playing its role as an engine of local development. Yet, the site's ecological value, its international recognition, and the commitment of the communities are major assets. Thus, ecotourism in Marojejy cannot be considered fully sustainable until the benefits are

extended to a larger proportion of the local population and the constraints of access, training and marketing are lifted.

4. Conclusion

Analysis of ecotourism around Marojejy National Park shows that this activity represents a tangible opportunity for economic diversification for local communities, while also supporting the conservation objectives of Madagascar National Parks . The results highlight real financial benefits for some households involved in guiding, accommodation, crafts, and related services, confirming that ecotourism can contribute to local economic viability. However, the overall impact remains limited by several structural constraints: geographical isolation, seasonality of visits, low professional capacity, lack of a sustained marketing strategy, and unequal distribution of benefits among villages. These factors reduce the expected redistributive impact of ecotourism and hinder its role as a genuine driver of sustainable development. The study highlights that the sustainability of ecotourism depends not only on the presence of visitors, but primarily on the organization of the value chain, community participation, and inclusive governance mechanisms. Without these conditions, benefits remain concentrated and collective commitment to conservation efforts may weaken. Ultimately, ecotourism in Marojejy possesses considerable, yet still under-exploited, potential. Better structuring of the offerings, strengthening local capacities, and shared governance would amplify its positive effects, making this activity a coherent lever for local development and the preservation of a globally important natural heritage, located within the Atsinanana Rainforests.

Recommendations

In order to strengthen the contribution of ecotourism to sustainable development around Marojejy National Park, a series of coordinated actions must be undertaken by all stakeholders: protected area managers, local authorities, private operators and riverside communities.

• Priority Improvement of Access Infrastructure.

The region's isolation remains the primary obstacle to increasing and stabilizing tourist traffic. Rehabilitating access roads, installing appropriate signage, and maintaining trails would reduce seasonality and improve safety for travelers. These investments, undertaken in coordination with local technical services, are essential for the economic viability of tourism.

• Professionalization and Training of Local Actors.

With the technical support of Madagascar National Parks and in line with World Tourism standards The organization should offer regular training programs to guides, hoteliers, restaurateurs, and artisans, covering topics such as tourist reception, hygiene , foreign languages, environmental interpretation, management, and marketing. Local skills certification would enhance the quality of services offered.

• Structuring the Local Ecotourism Value Chain .

It is essential to organize stakeholders into cooperatives or associations to better coordinate the supply (accommodation, food, crafts, transport, agricultural supplies). This structure would

facilitate market access, negotiation with tour operators, and a more equitable distribution of economic opportunities among villages.

• Implementation of an Integrated Territorial Promotion Strategy.

Despite the park's inclusion in the UNESCO World Heritage Site of the Rainforests of Atsinanana , international visibility remains low [4]. A digital marketing strategy, partnerships with ecotourism agencies, and the production of multilingual promotional materials would help attract a wider and more regular clientele.

• Participatory Governance and Redistribution Mechanisms.

Ecotourism governance committee, bringing together park managers, municipal authorities, and community representatives, would promote transparent decision-making. In parallel, a community fund, financed by a portion of entrance fees and tourism activities, could fund social projects (education, water, health) in less affluent villages.

• Diversification of Tourism Products.

Beyond trekking, the development of complementary activities (cultural tourism, village circuits, agritourism, experiential crafts) would broaden the economic benefits to a larger number of households and reduce dependence on visiting the park alone. The consistent implementation of these recommendations would make it possible to transform ecotourism into a genuine lever for inclusive local development, while consolidating the objectives of conserving the exceptional natural heritage of Marojejy.

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